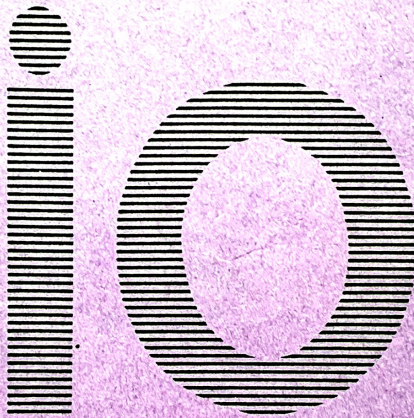


PROPORTIONAL MICROSPACING
DAISYWHEEL PRINTER DRIVER



Io Computer Communications

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Io Computer Communications
7 Great George Street
Glasgow G12 8PD

phone 041 - 339 5481

INTRODUCTION

The **Io** proportional microspacing printer driver is designed to give you full control over the spacing of characters on the printed page. It can be used with any printwheel, regardless of pitch. It overrides the pitch setting on the printer's front panel switch, and sends a spacing instruction to the printer for every character typed.

The driver consists of a number of separate programs. Here is a list of them:

- PMVIEW
- PMPRIN
- SPACER
- PMCODE

There is also a short program called **STARTUP** which may be used to initialise the printer. (see page 16.)

Before explaining in more detail how the full facilities of the driver can be controlled, it may be useful to define a few terms.

Proportional Spacing means that the space allocated to each character is in proportion to the size of that character. Wide letters like 'm' are given more space than narrow letters like 'l'. Many printers have a built-in facility for proportional spacing; however, using this facility normally causes loss of right margin justification. The **Io** driver allows Proprtional Spacing printwheels to be used even on those printers which do not support PS mode, since the computer will control the spacing of every character.

Justification, or to be precise, right margin justification, means that the right hand edge of the text forms a neat vertical line. Some word processors perform right margin justification by inserting extra spaces between words to pad out the line length. This tends to impart a blotchy appearance to the text due to the uneven gaps.

Microspacing. View has the facility for inserting small spaces between letters, so that the whole line is evenly spaced. This is termed 'Microspacing'. But this facility cannot be used with proportional spacing printwheels because the word processor allocates an equal amount of space to each character. Furthermore, the word processor assumes that the printer will be used with a 12-pitch printwheel; other pitch wheels give squashed or overstretched spacing. The Io printer driver allows microspacing to be used with any printwheel, whether Proportional or Uniform (10- 12- or 15-pitch) spacing.

Proportional Microspacing means that the space allocated to each character is in proportion to its width, while at the same time the right margin is justified by adjusting the fractional spaces between characters and between words so that the line is evenly spaced. This is how text is set out on typesetting machines used for reprographic work.

Physical Line Length is the length that a line of print occupies on the page. It is measured in inches and tenths of an inch.

Logical Line Length is the number of characters in a line of print.

HOW TO LOAD THE PRINTER DRIVER

Warning: loading the printer driver corrupts the contents of memory. If you already have text in the word processor, save it to disc (or cassette) before continuing. It is normally best to load the driver at the start of a session.

To use the printer driver, insert the disc into Drive 0 and type

```
*PMVIEW  
PRINTER SPACER  
*PMPRIN
```

(It is essential to type all three lines in the order given). The View command page will now read
Printer Spacer

Do not type 'Microspace'. The driver performs its own microspacing, and does not need to be given micro-spacing information from the word processor.

If you wish to revert to the default driver, type
PRINTER <RETURN>
and the View header will change to
Printer default.

Technical note. The action of PMVIEW is to reserve some memory for the printer driver before it is loaded. The actual occupation of memory by the driver depends on various factors such as which 'sideways ROMs' you have in your machine. You will find that there is slightly less memory available for text while the driver is loaded. This is of no consequence while printing from a file. If you subsequently need to edit a long file, you can retrieve all the memory by pressing <BREAK> and then typing *WORD. If you wish to re-load the driver when it has already been loaded, the safest way to do this is to press <BREAK> first; otherwise more and more memory will be taken each time the driver is re-loaded.

HOW TO USE THE DRIVER.

It is possible to simply load the driver and then print any document you may have on disc. But to use the full power of the driver, you will need to know something of how it works.

The physical line length (in inches) is quite independent of the logical line length (number of characters). The driver will fit however many characters there are in the line into the available line length. You specify the logical line length in the normal way, using the 'ruler' in View. You specify the physical line length using a highlight code, HT=159 (see page 6).

Because justification is performed by the driver, it should not be performed by the word processor as well. When you are entering or editing text, make sure the Justification flag is off. If you accidentally leave it on, View will insert extra spaces between words: the result will still be justified correctly, but the appearance of the text will be ragged.

Not all lines are justified. In most normal text the last line of each paragraph is not justified. In some kinds of text (such as poetry, tables or addresses) this may not apply. This printer driver uses the following 'rule' for deciding whether to justify or not: a line will be justified if the first character of the next line is a printable character; if the first character of the next line is not printable (for example, if the next line is blank or if it starts with a space or a tab or a control character) then the current line will not be justified. This rule works satisfactorily in most situations. But for those occasions where the rule is inappropriate, five highlight codes (numbers 150 to 154) are available for forcing justification on or off. These are explained fully on page 9.

HOW TO DEFINE THE PHYSICAL LINE LENGTH.

The physical line length is always measured in inches and tenths of an inch. It is defined in the text by issuing the highlight code 159 followed by two numbers, ie the number of inches and the number of tenths of an inch.

For example, to define a physical line length of four and a half inches, your text would start like this:

```
.. >.....<  
HT 1 159  
First line of text _45
```

In this example, the '45' will not be printed; these numbers simply tell the driver what the line length is to be.

You may use either HT1 or HT2 - it makes no difference. The two numbers must follow the highlight immediately, with no spaces in between. But the highlight and the two numbers may appear anywhere on the line.

Both numbers must be used, even if the line length is to be less than one inch. So for example if you want a length of 0.8 inches your text would start like this:

```
.. >.....<  
HT 1 159  
First line of text _08
```


Of course, defining the physical line length is normally done on the first line of the text; but the line length may be redefined anywhere in the text. The new line length comes into effect immediately (ie it applies to the line on which it is found) and remains in effect until a new length is defined.

If you do not specify any physical line length, then the driver defaults to a length of 6.6 inches.

How do you calculate how long the physical line length should be for a given logical line length? Or conversely, how many characters should you allow in your ruler if you want the resulting line to fit into a given amount of space? The answer is largely a matter of taste. But as a general rule, allow about thirteen characters to the inch, or slightly more.

A slight problem may sometimes arise. Remember that the printer driver is not a word processor: the splitting of text into lines is performed by View not by the driver, and View does not take into consideration the width of the characters. So if a line contains an unusually large proportion of wide characters, they may need to be squashed together to fit into the space available. This sometimes occurs if the line contains a large number of upper case (capital) letters. When composing text, it is as well to bear this in mind. If you are putting words in capitals, use the 'split line' key or the 'LJ' stored command to prevent the line becoming too long.

Technical note. The method given above allows you to specify any length up to 9.9 inches. It is possible to have lengths up to 15.9 inches (if your printer is wide enough). To do this, you use a letter instead of the first number. The following table shows the letters which correspond to the numbers of whole inches. (The letter may be written in either upper or lower case.)

Letter	Number of whole inches.
J	10
K	11
L	12
M	13
N	14
O	15

For example, to define a physical line length of 10.7 inches, your text would start like this:

```
.. >.....<
HT 1 159
    First line of text _J7
```

There is a limit of 132 characters per line, both in View and in the printer driver. Exceeding this limit will result in the driver producing the error message 'line too long' and aborting the print.

HOW TO CONTROL THE JUSTIFICATION

As already mentioned (page 5), the driver will perform right margin justification if the first character of the following line is printable; otherwise it will use normal (proportional or fixed-pitch) spacing.

To give the user full control, the following five highlight codes are provided:

- 150 justification OFF this line,
- 151 justification ON this line,
- 152 justification OFF,
- 153 justification ON,
- 154 justification by default rule.

Any of these highlights may appear anywhere in the line. Number 150 will cause that line to be not justified, regardless of the normal rule, and number 151 will cause that line to be justified, regardless of the normal rule.

Number 152 will switch off justification until further notice. That is, the line on which that highlight appears will not be justified, nor will any subsequent lines until either number 153 or 154 appear. Similarly, highlight 153 will cause the present line and all subsequent lines to be justified, until cancelled with highlight 152 or 154. Highlight 154 puts the driver back into its normal state, ie deciding on the basis of the first character of the following line.

While numbers 152 or 153 are in force (justification permanently off or permanently on), the effect may still be reversed for one line by using number 150 or 151 as appropriate.

Here are some examples.

1. To print an address on the left margin.

```
.. >.....<
HT 1 150
    Mr Arthur Dent_
    1 Suburbia Close_
    Wimbledon.
```

2. To print an address on the right margin.

```
.. >.....<
HT 1 151
                _Julia MacPherson
                _Grange Farm
                _Lothiemouth
```

3. To include a verse in normal text.

```
.. >.....<
    Last line of normal text.
HT 1 152
    First line of poem_
    Second line
    Third line
HT 1 154
    First line of_ normal text
```

(It is often simpler to indent the unjustified block a few spaces in from the left margin.)

UNIFORM MICROSPACING.

The **Io** printer driver also supports uniform microspacing. This facility is slightly different from the microspacing provided by **View** in that the physical line length is specified independently of the logical line length, and the justification is controlled by the driver not by the word processor. In other words, you have exactly the same facilities in Uniform microspacing mode as in Proportional microspacing mode.

Changing between Uniform and Proportional modes is done with highlight commands. The relevant numbers are 160 upwards. These are defined in the table below:

HT	Effect
160	Proportional microspacing,
168	Uniform for 15-pitch wheels,
170	Uniform for 12-pitch wheels,
172	Uniform for 10-pitch wheels.

For example, if you want to use uniform microspacing with a 12-pitch printwheel, the start of the text would look like this:

```
.. >.....<
HT 1 170
    First line of text_
```

As before, the highlight may appear anywhere in the line, and takes effect immediately. The new spacing will apply to the current line and all subsequent lines until changed or cancelled. Highlight 160 will put the driver back into Proportional microspacing mode; highlights 161 upwards will put the driver into uniform microspacing mode.

The highlight number (161 or greater) controls the character spacing on lines which are not justified. On any line which is justified, all the characters will be fitted evenly into the physical line length regardless of the printwheel pitch. Every character will receive the same amount of space.

When specifying the physical line length, you should calculate this from the maximum number of characters per line, bearing in mind the pitch of the printwheel. Two useful formulae are

1. Physical length equals logical length divided by printwheel pitch.
2. Logical length equals physical length multiplied by printwheel pitch.

Technical note. Numbers other than those in the table can be used: for example, if you are using a 10-12 dual pitch wheel, then setting the highlight to 171 gives pleasing results. To be more precise, you can obtain any spacing in units of 1/120th of an inch. Decide how many units you want per character, then add 160. For example, if you want eight characters to the inch, then the number of units is 15 (ie 120 divided by 8), so you would set out the text like this:

```
.. >.....<  
HT 1 175  
first line of text_
```


NORMAL HIGHLIGHTS

The **Io** printer driver supports the two default highlights used in View. These control underscore and bold type, and work as described in the View manuals. A few comments may be helpful.

Firstly, since your text will normally make use of the highlight codes to define the physical line length etc, the highlights may need to be redefined before they can be used for underscore or bold type. The appropriate values are

HT 128	Underscore,
HT 129	Bold.

So the start of text may typically look like this:

```
.. >.....<
HT 2 159
   _Title Underlined_ *45

HT 2 129
   Now *bold* is available.
```

Secondly, although most daisywheel printers support bold type, this does not generally show up very well. Instead, shadow type is used for emphasis. The **Io** printer driver provides shadow type instead of true bold.

Thirdly, on some printers (eg Juki) bold type is automatically cancelled at the end of every line. Underscore is not, and will remain in force until cancelled by the same highlight code.

EXTRA HIGHLIGHTS

In addition to the normal highlights for underscore and bold and the special highlights for spacing control, the Io printer driver supports some further highlights for 'pound', 'pause' and 'tab'.

Highlight number 131 prints the pound sign.

```
.. >.....<  
HT 2 131  
    The price is *4.99
```

The 'pause' highlight (number 158) causes the printing to stop at that point and wait until a key is pressed. This highlight can be used to change the daisywheel in mid text (even in mid line) or to change the paper, change to a different colour ribbon, insert a gap, or make any other manual changes. It is very useful when filling in forms. (If a key has been pressed before the highlight is reached, there will be no pause since the key will have been stored in the BBC's input buffer.)

```
.. >.....<  
HT 2 158  
    Stop and *wait here.
```


HORIZONTAL TABS

Horizontal tabbing is normally performed in View with the 'ruler' and the TAB key. This method is not reliable when using PS printwheels. View converts the TAB character into spaces, and the size of the spaces may vary. For this reason, the **Io** printer driver offers two further ways of obtaining horizontal tabs.

In the first method, the tab stop positions are set up on the printer rather than in the computer. This is done with the STARTUP program (see page 16). Moving to a tab position is then accomplished with highlight code number 130. The driver has no information on the positions of these 'printer' tabs, and consequently cannot justify lines which include them. The method is intended primarily for setting out tables etc.

The second method is intended for indenting the first lines of paragraphs, and retains right margin justification. The appropriate highlight code is number 139. This highlight causes the print head to move to the right by approximately one sixteenth of the physical line length. It should only be used at the start of a line: in other positions it may disrupt justification. Although the tab width is fixed, the highlight may be used several times in succession if deeper indentation is required.

It may be necessary to reduce the number of characters in the line when using this highlight, in order to prevent the driver having to squash a full line into the reduced space available. Use the 'split line' key or the 'LJ' stored command to control line length.

```
.. >.....<
HT 1 130
HT 2 139
   _first column_second
   _second column_third

*New paragraph
```

PRINTER INITIALISATION

The program STARTUP can be used to set tabstops and line spacing, and may also set carriage settling time (depending on the printer).

STARTUP is completely independent of the language or word processor you are currently using. It is equally applicable in conjunction with Wordwise or with Basic program listings etc.

To use the program, insert the disc and type
*STARTUP <RETURN>

Warning: using the STARTUP program corrupts part of the printer driver. After using STARTUP you **must** re-load the corrupted section by typing
*PMPRIN <RETURN>

First the message 'Tabs (*)' appears on the screen. You can now set up the positions of the tab stops which will be used with highlight code number 130 (see page 15). In effect you will be writing a 'ruler' on the printer rather than in the word processor.

By pressing the space bar, you can move the print head to the right. Pressing the DELETE key moves it to the left (provided it is not already at its left limit). When it is correctly positioned, type * and a printer tab stop will be set at that position. Any number of tab positions may be set up this way. When you have set as many as you want, press RETURN. If you do not wish to set any tab stops, simply press RETURN in response to the prompt.

Next the message 'Line spacing ?' appears on the screen. The number you enter is the physical spacing between lines, in units of 1/48th of an inch. Standard single line spacing is 8 units per line, giving six lines per inch. 15-pitch printwheels can be used with line spacing of 6 units, giving eight

$$4 \text{ lpi} = \frac{12}{48} + 1 = 13$$

lines to the inch. You can specify any number between zero and 48 (ie one line per inch). If you wish to leave the line spacing unaltered, simply press RETURN without entering any number.

Thirdly, the message 'Slow ?' appears. Some printers offer the facility for increasing the carriage settling time. Normally, printing is carried out as fast as the carriage and the printwheel can be moved. By setting an increased settling time, the mechanism will pause for a fraction of a second before printing each character. The effect is to slow down the printing process but to improve the quality. To select slow printing, press 'Y' (this must be a capital Y); all other keys have no effect.

Remember to re-load the driver by typing *PMPRIN.

COPYING FROM CASSETTE TO DISC

The following is the procedure for copying the drivers from cassette to disc.

```
*TAPE
*BASIC
MODE 7
PAGE=&4000
*LOAD PMVIEW
*DISC
*SAVE PMVIEW C00 D00
*TAPE
*LOAD PMPRIN
*DISC
*SAVE PMPRIN C00 D00
*TAPE
*LOAD STARTUP
*DISC
*SAVE STARTUP C00 D00
*TAPE
*LOAD PMCODE 3A00
*DISC
*SAVE PMCODE 3A00 3D00
*TAPE
*WORD
PRINTER SPACER
*DISC
*SAVE SPACER 400 500
```

A second copy of all files is recorded at 300 baud. In case of difficulty loading any programs, type *TAPE 3 instead of *TAPE on the above lines.

The same procedure may be used for copying the programs from disc onto a different filing system (such as ADFS). Simply change the *TAPE and *DISC lines in the above procedure into the appropriate *command lines for the various filing systems. There is no "protection" on any of the files, but please observe the notice on page 1 of this manual regarding the copying of programs.

LIST OF HIGHLIGHT CODES.

HT	EFFECT
128	Underscore on/off,
129	Bold (shadow) on/off,
130	Horizontal tab,
131	Pound sign,
150	Justification OFF this line,
151	Justification ON this line,
152	Justification OFF,
153	Justification ON,
158	Pause,
154	Justification by default rule,
160	Proportional microspacing,
168	Uniform for 15-pitch wheels,
170	Uniform for 12-pitch wheels,
172	Uniform for 10-pitch wheels.

This manual was written on a BBC microcomputer running the View A1.4 word processor. It was printed on a Juki 6100 via the 10 proportional microspacing printer driver. The printwheels were Madeleine PS and Courier 10.

View is a product of Acornsoft Ltd, Cambridge.